

Compartment Syndrome

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Topics to Cover

- Definition
- Pathophysiology
- Types
- Locations
- Causes
- Diagnosis & clinical picture
- Treatment
- Complications

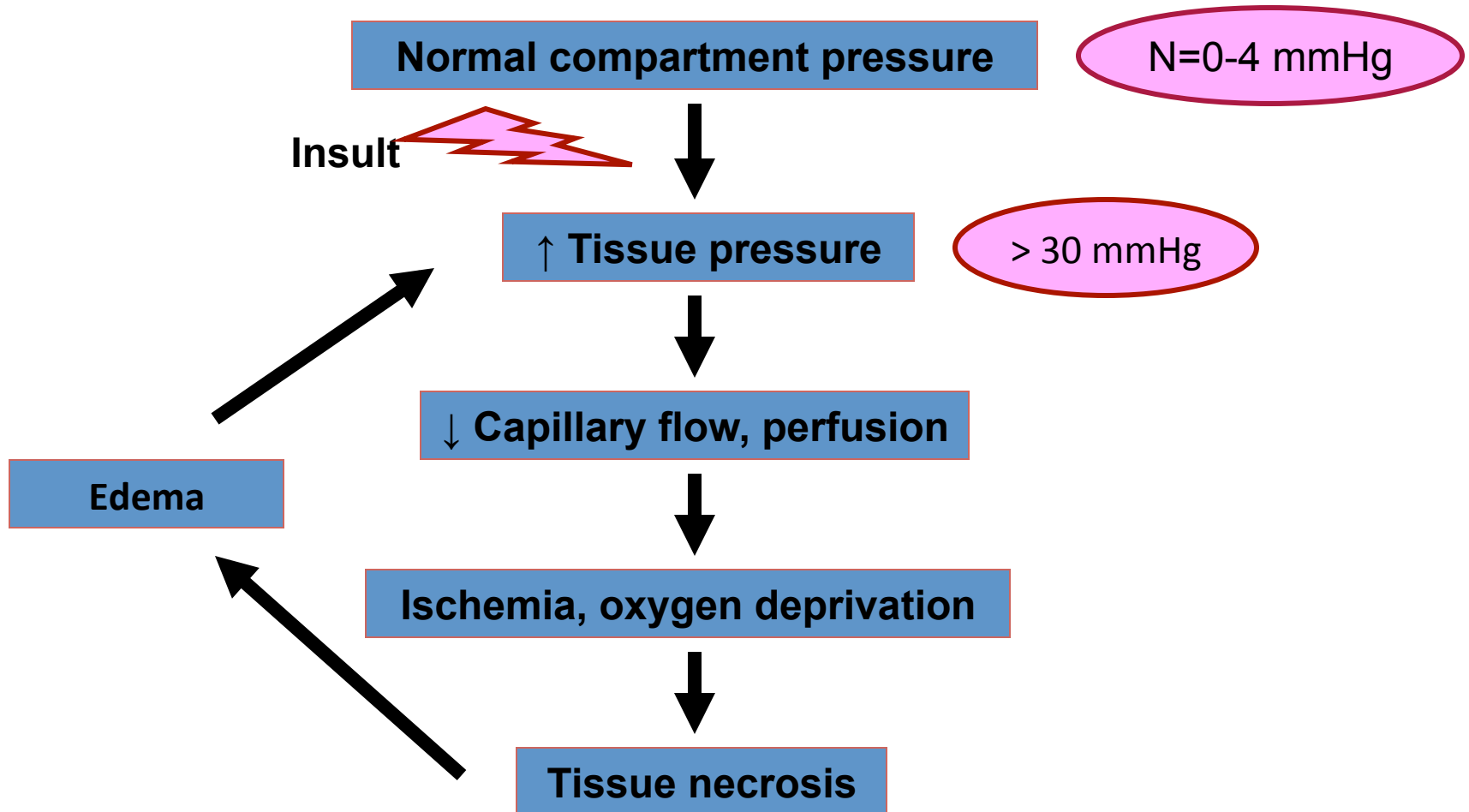
Definition

Compartment Syndrome

- “Pressure increase inside a fascial compartment causing vascular compression”
- It begins when tissue pressure exceeds the venous pressure and impairs blood outflow

Pathophysiology

Pathophysiology



A True Orthopedic Emergency

Pathophysiology

- Must treat by 4-6h → after that permanent damage will occur
- If operated:
 - (<12h) of Comp. Synd. onset → normal function regain is ~ 68%
 - (>12h) → only 8%

Types

Types

1. Acute

2. Chronic:

- It is → recurrent syndrome during exercise or work
- Characterized by → pain & disability that subside when the activity is stopped, but return when the activity is resumed
- In → runners & cyclist
- Common in → anterior compartment of lower leg
- Also described in → forearm of motocross racers

Locations

Locations

- Leg
- Forearm
- Foot
- Hand
- Thigh
- Arm
- Abdominal
- Intracranial
- Ocular

Causes

Causes

- Internal:
 - Fracture (open/closed)
 - Soft tissue / crush injury
 - Post operative (fascia closure)
 - I.M.N (reaming)
 - Lithotomy position
 - Bleeding disorders
 - Post ischemic re-perfusion
 - Arterial embolus
 - Arterial & venous lines
 - Electrical injury
 - Snake bite
- External:
 - Circumferential wound cover
 - Tight cast / slab
 - Circumferential burn

Diagnosis
&
Clinical Picture

Compartment Syndrome

- A clinical diagnosis
- Should have a high index of suspicion



Clinical Picture – 5P

- Trauma / Fracture / Operation

- Pain:

- Pain out of proportion of expectation
- Increased pressure / burst sensation
- Pain with passive motion / stretch



TREAT

- Parasthesia
- Paralysis
- Pallor
- Pulselessness ➔ too late, >8h

Clinical Picture

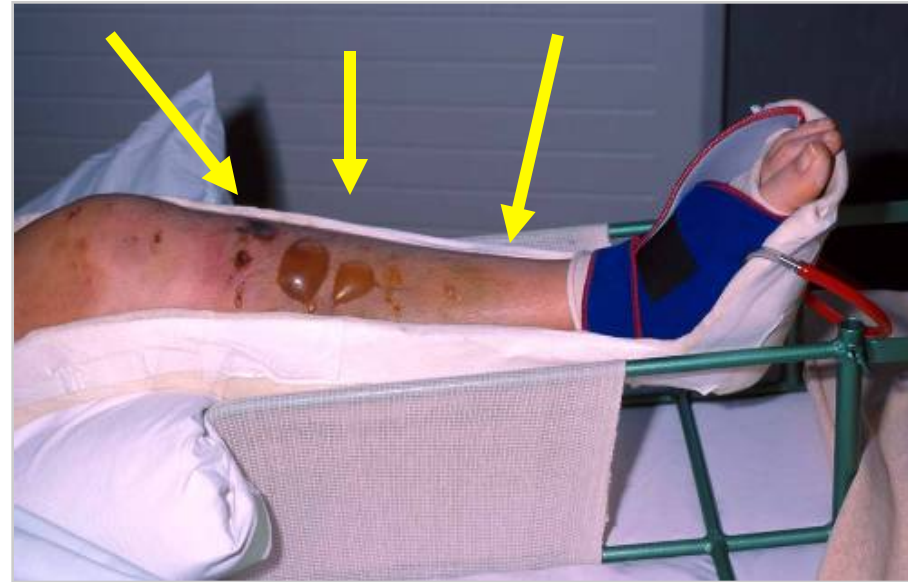


Shiny skin

Dusky

Blisters

Shiny skin



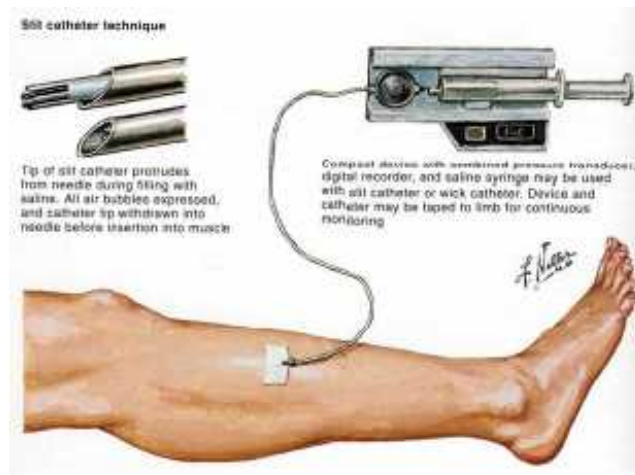
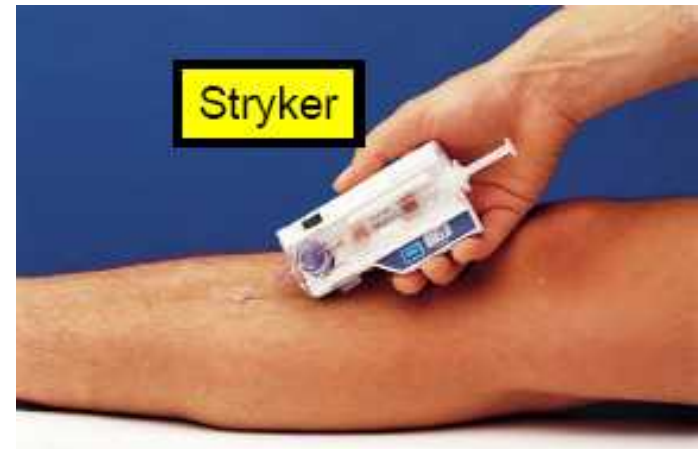
Clinical Picture



Clinical Picture

- Measure pressure only if:
 - Clinical picture equivocal
 - Altered unconscious
 - Multiple injuries
 - Epidural anesthesia
 - Concomitant nerve injury
 - Children

Compartment Pressure Measurement



Compartment Pressure Measurement



Compartment Pressure Measurement



Treatment

Treatment

- It is surgical
- Need few steps just before the surgery

Treatment

- Close observation if:
 - Clinical picture and measurement equivocal
 - Altered unconscious
 - Multiple injuries
 - Epidural anesthesia
 - Concomitant nerve injury
 - Children

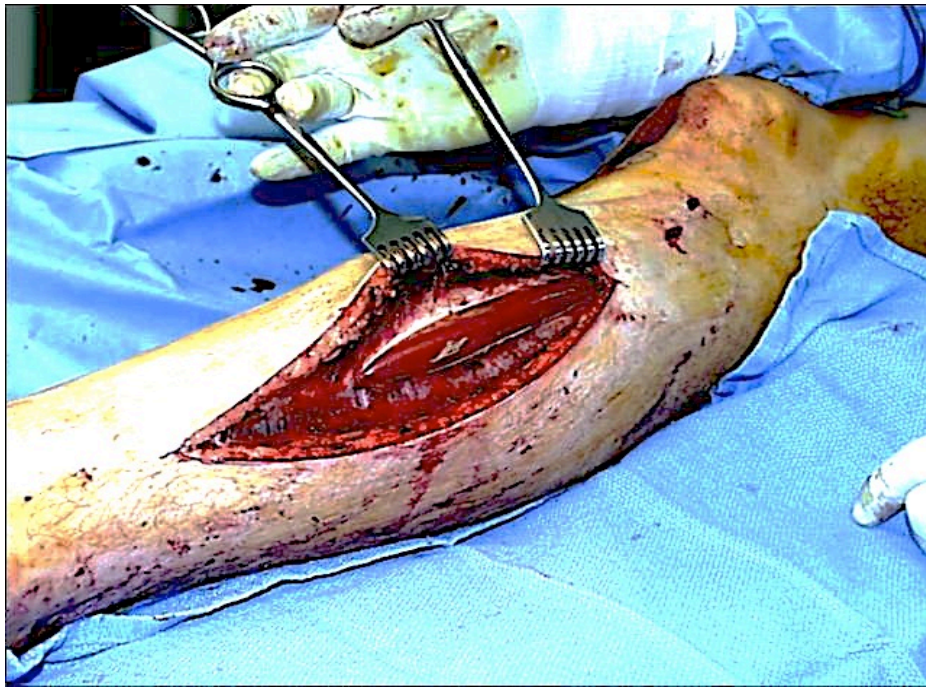
Treatment - Precautions

- Splitting (bivalving) cast with its cotton to skin
- Removal of circular bandage
- Limb at level of heart
- Correct hypotension & bleeding disorders (colloid, crystalloid, blood & its products)
- Oxygen via mask

Treatment - Surgical

- Fasciotomy indicated:
 - Compartment pressure $> 30\text{mmHg}$
 - $> 30\text{ mmHg}$ above the diastolic B.P
 - Compartment syndrome with # → during ORIF
 - Symptoms & signs not resolve after (30 & 60min) of appropriate precautions
 - Prophylactic with corrective osteotomy of the leg & forearm

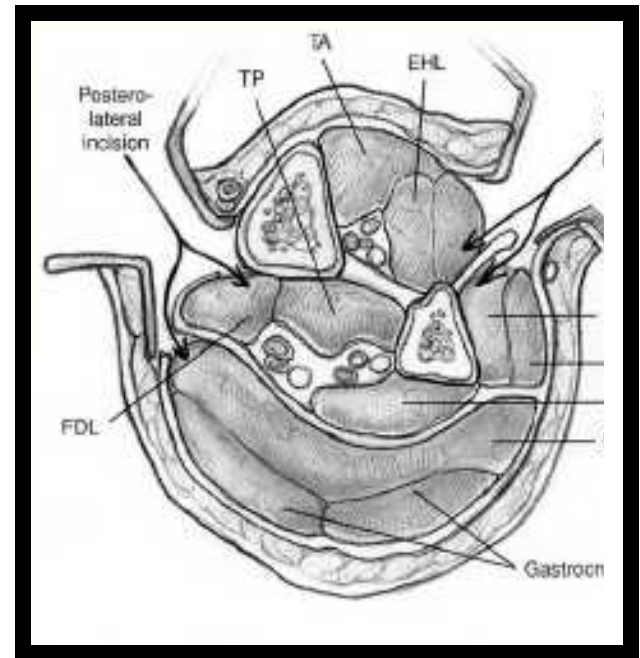
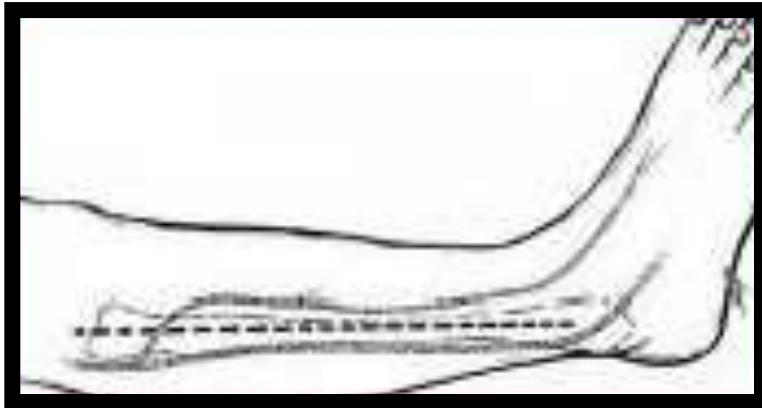
Treatment - Surgical



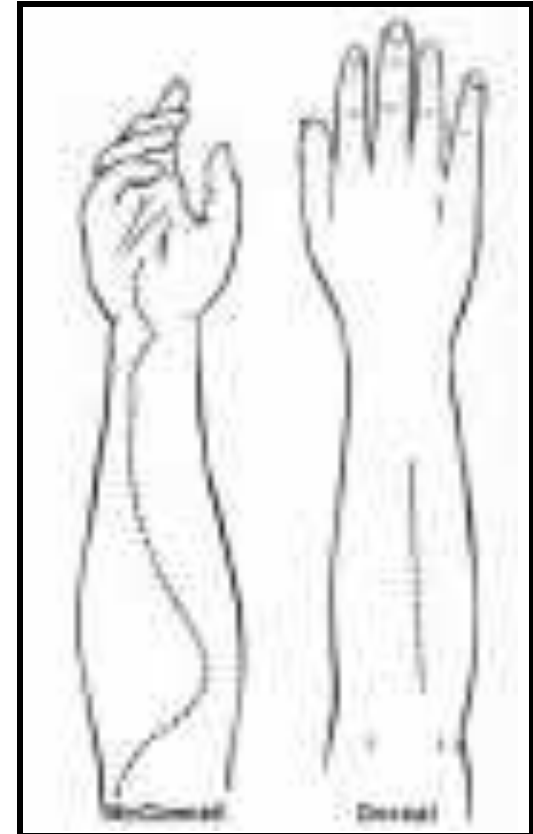
Treatment - Surgical

- Fasciotomy principles:
 - Long extensile incisions
 - Release of all facial compartments
 - Debride necrotic tissue (4 C's)
 - Never close fascia
 - Keep wound open
 - Repeated looks Q48h, as needed
 - Aim to close the wound on day 7-10

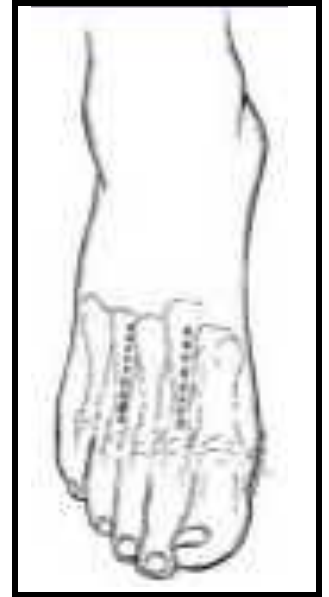
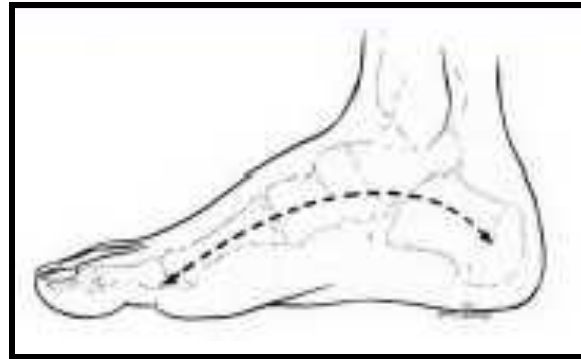
Fasciotomy



Fasciotomy



Fasciotomy



Treatment - early

Color red

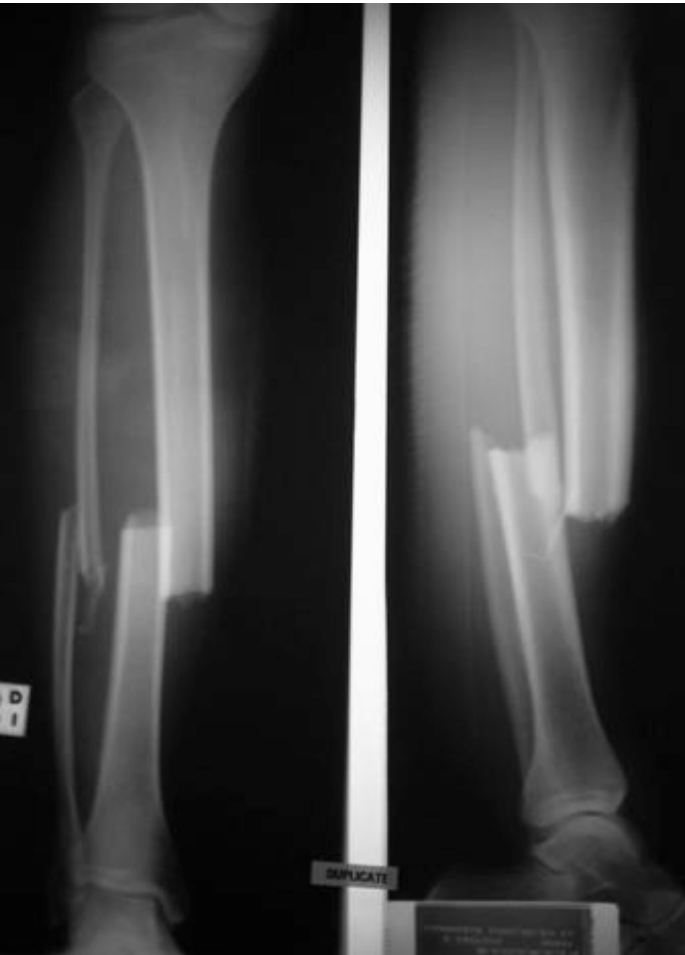
No loss of consistency

Ability to contract

Capable to bleed



Treatment – late



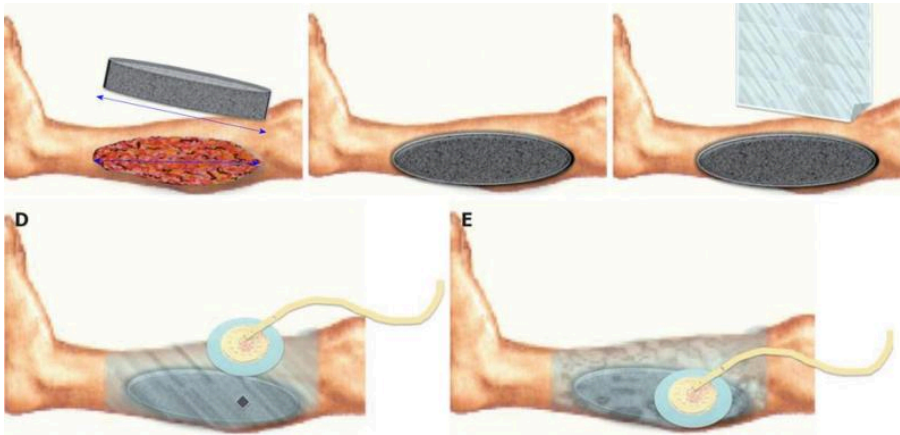
Treatment - Surgical

- Wound closure:
 - Bulky dressing with a splint
 - “Boot lace” vessel loop closure
 - V.A.C dressing “Vacuum Assisted Closure”
 - Latter skin graft / flap

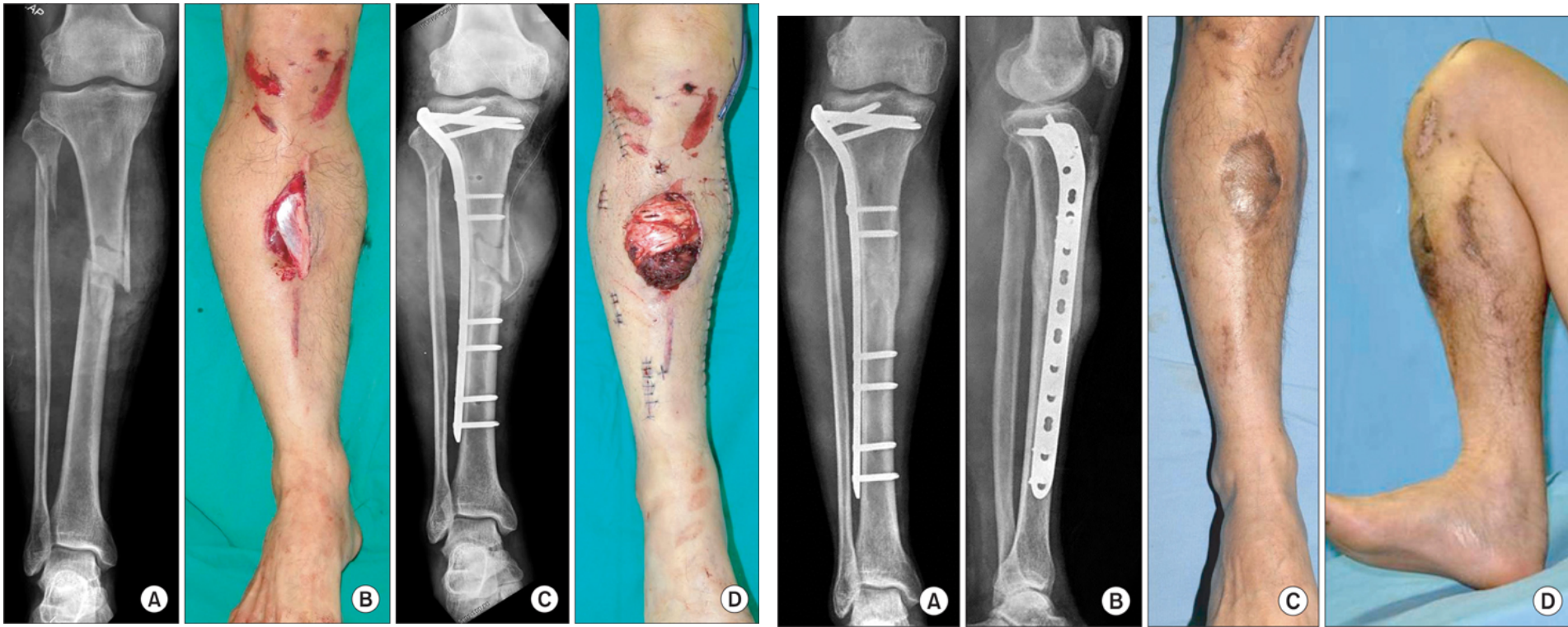


Treatment - Surgical

- Wound closure:
 - V.A.C dressing “Vacuum Assisted Closure”.



Treatment - Surgical



Contraindication to fasciotomy

- Confirmed acute compartment syndrome diagnosis for > 48h:
 - Damage cannot be reversed, &
 - Significant infection rate when dead tissue exposed
- Already dead muscles, as in crush injuries

Complications

Complications

- Functional disability:
 - Muscle weakness/paralysis
 - Sensory disturbance/loss
 - Chronic pain
- Cosmetic:
 - Deformity
 - Contracture
 - Grafts
- Amputation

Any Question?

Remember

Take Home Message

- It is a true surgical emergency
- A clinical diagnosis
- Should have a high index of suspicion
- Treat once you suspect
- Treatment is only fasciotomy, after taking all the precautions
- “Time” is the most important factor to avoid irreversible complications
- If clinically diagnosed don’t measure pressure
- Always keep in mind the high risk patients
- > 30 mmHg is fasciotomy threshold (arterial line)
- No circumferential dressing
- Even with elective surgeries compartment syndrome may occur

Lecture Objectives

- Definition
- Pathophysiology
- Types
- Causes & risk factors
- Diagnosis & clinical picture
- Treatment
- Complications

References

- Sheridan & Matsen, Fasciotomy In The Treatment Of Acute Compartment Syndrome, JBJS, 58-A:112, 1976
- Medscape, Acute Compartment Syndrome, Author: Abraham T Rasul, Jr, MD; Chief Editor: Consuelo T Lorenzo, MD